Patent Claims

1. A treatment unit for the wet-chemical or electrolytic treatment of flat workpieces, comprising conveying members for transporting the workpieces in the unit on a conveying path, characterized in that the treatment unit further comprises

a) carrier elements (4, 5) with recesses (21), said carrier elements being oriented to be parallel to the conveying path and

b) at least one module system for carrying the conveying members (6, 6', 6", 7), said module system comprising insertion elements (13, 14, 26), said insertion elements (13, 14, 26) being configured such that they are fitted into the recesses (21) of the carrier elements (13, 14, 26).

2. The treatment unit according to claim 1, characterized in that the insertion elements (13, 14, 26) are secured to the carrier elements by screws, eccentric clamps or rocker levers.

3. The treatment unit according to any one of the preceding claims, characterized in that the conveying members (6, 6', 6", 7) are carried on both sides of the conveying path, with said conveying members (6, 6', 6", 7) extending in a transverse or substantially transverse direction relative to the conveying path.

4. The treatment unit according to any one of the preceding claims, characterized in that the conveying members (6, 6', 6", 7) are conveyor rolls and/or conveyor wheels or conveyor balls and/or spiral-shaped conveying members, the conveyor wheels or conveyor balls being mounted on axles.

5. The treatment unit according to claim 4, characterized in that those conveyor wheels or conveyor balls which have different axles are offset relative to each other and in that the axles are arranged so close together that the conveyor wheels or conveyor balls overlap as viewed in the direction of the axle.

6. The treatment unit according to any one of the preceding claims, characterized in that the conveying path extends in a substantially horizontal plane.

7. The treatment unit according to any one of the preceding claims, characterized in that the treatment unit comprises treatment devices (16, 17) for the wet-chemical or electrolytic treatment, said treatment devices being held by the insertion elements (26).

8. The treatment unit according to claim 7, characterized in that the treatment devices (16, 17) are flow nozzles, jet nozzles, fan nozzles, ultrasonic transducers and/or insoluble anodes.

9. The treatment unit according to any one of claims 7 and 8, characterized in that the insertion elements (26) comprise connectors for supplying the treatment devices (16, 17) with treatment media or with power.

10. The treatment unit according to any one of the preceding claims, characterized in that the insertion elements (13, 14, 26) comprise bores (15) and/or slots (22) and/or long holes for carrying the conveying members (6, 6', 6", 7), said slots and long holes extending substantially normal to the conveying path.

11. The treatment unit according to any one of the preceding claims, characterized in that it further comprises a drive shaft (25) that is oriented to be parallel to at least one of the carrier elements (4, 5) outside of the conveying path and that drives the conveying members (6, 6', 6", 7).

12. The treatment unit according to any one of the preceding claims, characterized in that the axles of the conveying members (6, 6', 6", 7) protrude from that side of at least one of the insertion elements (13, 14, 26) that is turned away from the conveying path and that the axles are equipped with toothed wheels for transmitting the force to the conveying members (6, 6', 6", 7).

13. The treatment unit according to claim 12, characterized in that the toothed wheels are at least one of deflector wheels (27, 27') and spur gears (9, 29, 29').

14. The treatment unit according to claim 13, characterized in that the axles of the conveying members (6, 6', 6", 7) comprise either a deflector wheel (27, 27') or a spur gear (9, 29, 29') or a combination consisting of deflector wheel (27, 27') and spur gear (9, 29, 29').

15. The treatment unit according to any one of claims 13 and 14, characterized in that the deflector wheels (27, 27', 28) are any of bevel gears, worm-gears and helical gears.

16. The treatment unit according to any one of claims 11 to 15, characterized in that the drive shaft (25) comprises deflector wheels (28) corresponding to and engaging the deflector wheels (27, 27') of the conveying members (6, 6', 6", 7).

17. The treatment unit according to any one of the preceding claims, characterized in that, on that side of at least one of the insertion elements (13, 14, 26), that is turned away from the conveying path, the insertion elements (13, 14, 26) are provided with at least one translating spur gear (8, 8') for transmitting the force between two conveying members (6, 6', 6", 7).

18. The treatment unit according to any one of claims 13 to 17, characterized in that the spur gears (9, 29, 29') on the conveying members (6, 6', 6", 7) and the translating spur gears (8, 8') are arranged relative to each other and engage in such a manner that the direction of rotation of the spur gears (9, 29, 29') remains unchanged.

19. The treatment unit according to any one of claims 13 to 18, characterized in that the spur gears (29, 29') comprise, in addition to a gear rim, a collar of a diameter smaller than the gear rim, thus making it possible to dispose the axles of the conveying members (6, 6', 6", 7) close to each other, the collar being formed either in front or behind the gear rim as viewed in the direction of the axle of the conveying members (6, 6', 6", 7).

20. The treatment unit according to any one of the preceding claims, characterized in that the insertion elements (6, 6', 6", 7) are arranged in pairs.

21. The treatment unit according to any one of the preceding claims, characterized in that the insertion elements (6, 6', 6", 7) are fittingly slidable into the recesses (21) of the carrier elements (13, 14, 26).

22. Use of the treatment unit according to any one of claims 1 – 21 for treating flat workpieces in a horizontal conveyorized line.